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SOME BOTANICAL NOTES FROM "THE CRUISE OF THE CORWIN"

BY JOHN MUIR

In 1881 John Muir accompanied the "Corwin's" expedition in search of the "Jeannette" to the islands in Bering Sea and off the coast of Siberia. His account of that trip, in the form of a Journal, has been recently published and contains a fascinating account of a little-known region.*

The greater part of the volume appears now for the first time and will prove to all interested in that region the best account of it that one can find. In the Appendix is printed Muir's account of glaciation and "Botanical Notes." Part of this, without the author ever having seen the proofs was printed as a Treasury Department Document and is now practically unknown. The editor has added to this Muir's report on the flora of Herald Island and Wrangell Land which "remains after thirty-six years, the only one ever made on the vegetation of these remote Arctic regions." All of the book is well worth reading and the reprinting of the botanical section of the Appendix, through the courtesy of the publishers, makes available to our readers that part of the volume which relates to plants.—N. T.

INTRODUCTORY

The plants named in the following notes were collected at many localities on the coasts of Alaska and Siberia, and on St. Lawrence, Wrangell, and Herald Islands, between about latitude 54° and 71° N., longitude 161° and 178° W., in the course of short excursions, some of them less than an hour in length. Inasmuch as the flora of the arctic and subarctic regions is nearly the same everywhere, the discovery of many species new to science was not to be expected. The collection, however, will no doubt be valuable for comparison with the plants of other regions. In general the physiognomy of the vegetation of the polar regions resembles that of the alpine valleys of the

* Muir, J. The Cruise of the Corwin. Journal of the Arctic Expedition of 1881 in search of DeLong and the Jeannette. Edited by W. F. Bade. Pp. 1-279. Houghton Mifflin Company, Boston, 1917. Price \$2.75. The following reprint from this volume is possible through the courtesy of the publishers.

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temperate zones; so much so that the botanist on the coast of Arctic Siberia or America might readily fancy himself on the Sierra Nevada at a height of ten to twelve thousand feet above the sea.

There is no line of perpetual snow on any portion of the Arctic regions known to explorers. The snow disappears every summer, not only from the low, sandy shores and boggy tundras, but also from the tops of the mountains, and all the upper slopes and valleys with the exception of small patches of drifts and avalanche-heaps hardly noticeable in general views. But though nowhere excessively deep or permanent, the snow-mantle is universal during winter, and the plants are solidly frozen and buried for nearly three fourths of the year. In this condition they enjoy a sleep and rest about as profound as death, from which they awake in the months of June and July in vigorous health, and speedily reach a far higher development of leaf and flower and fruit than is generally supposed. On the drier banks and hills about Kotzebue Sound, Cape Thompson, and Cape Lisburne, many species show but little climatic repression, and during the long summer days grow tall enough to wave in the wind, and unfold flowers in as rich profusion and as highly colored as may be found in regions lying a thousand miles farther south.

UNALASKA

To the botanist approaching any portion of the Aleutian chain of islands from the southward during the winter or spring months, the view is severely desolate and forbidding. The show comes down to the water's edge in solid white, interrupted only by dark, outstanding bluffs with faces too steep for snow to lie on, and by the backs of rounded rocks and long, rugged reefs beaten and overswept by heavy breakers rolling in from the Pacific, while throughout nearly every month of the year the higher mountains are wrapped in gloomy, dripping storm-clouds.

Nevertheless, vegetation here is remarkably close and luxuriant, and crowded with showy bloom, covering almost every foot of the ground up to a height of about a thousand feet above the sea—the harsh trachytic rocks, and even the cindery

bases of the craters, as well as the moraines and rough soil-beds outspread on the low portions of the short, narrow valleys.

On the twentieth of May we found the showy *Geum glaciale* already in flower, also an arctostaphylos and draba, on a slope facing the south, near the harbor of Unalaska. The willows, too, were then beginning to put forth their catkins, while a multitude of green points were springing up in sheltered spots wherever the snow had vanished. At a height of four or five hundred feet, however, winter was still unbroken, with scarce a memory of the rich bloom of summer.

During a few short excursions along the shores of Unalaska Harbor, and on two of the adjacent mountains, towards the end of May and the beginning of October, we saw about fifty species of flowering plants—*empetrum*, *vaccinium*, *bryanthus*, *pyrola*, *arctostaphylos*, *ledum*, *cassiope*, *lupinus*, *geranium*, *epilobium*, *silene*, *draba*, and *saxifraga*, being the most telling and characteristic of the genera represented. *Empetrum nigrum*, a *bryanthus*, and three species of *vaccinium* make a grand display when in flower, and show their massed colors at a considerable distance.

Almost the entire surface of the valleys and hills and lower slopes of the mountains is covered with a dense, spongy plush of lichens and mosses similar to that which covers the tundras of the Arctic regions, making a rich green mantle on which the showy, flowering plants are strikingly relieved, though these grow far more luxuriantly on the banks of the streams where the drainage is less interrupted. Here also the ferns, of which I saw three species, are taller and more abundant, some of them arching their broad, delicate fronds over one's shoulders, while in similar situations the tallest of the five grasses that were seen reaches a height of nearly six feet, and forms a growth close enough for the farmer's scythe.

Not a single tree has been seen on any of the islands of the chain west of Kodiak, excepting a few spruces brought from Sitka and planted at Unalaska by the Russians about fifty years ago. They are still alive in a dwarfed condition, having made scarce any appreciable growth since they were planted.

These facts are the more remarkable, since in southeastern Alaska, lying both to the north and south of here, and on the many islands of the Alexander Archipelago, as well as on the mainland, forests of beautiful conifers flourish exuberantly and attain noble dimensions, while the climatic conditions generally do not appear to differ greatly from those that obtain on these treeless islands.

Wherever cattle have been introduced they have prospered and grown fat on the abundance of rich nutritious pasturage to be found almost everywhere in the deep, withdrawing valleys and on the green slopes of the hills and mountains, but the wetness of the summer months will always prevent the making of hay in any considerable quantities.

The agricultural possibilities of these islands seem also to be very limited. The hardier of the cereals—rye, barley, and oats—make a good, vigorous growth, and head out, but seldom or never mature, on account of insufficient sunshine and overabundance of moisture in the form of long-continued, drizzling fogs and rains. Green crops, however, as potatoes, turnips, cabbages, beets, and most other common garden vegetables, thrive wherever the ground is thoroughly drained and has a southerly exposure.

ST. LAWRENCE ISLAND

St. Lawrence Island, as far as our observations extended, is mostly a dreary mass of granite and lava of various forms and colors, roughened with volcanic cones, covered with snow, and rigidly bound in ocean ice for half the year. Inasmuch as it lies broadsidewise to the direction pursued by the great ice-sheet that recently filled Bering Sea, and its rocks offered unequal resistance to the denuding action of the ice, the island is traversed by numerous ridges and low, gap-like valleys all trending in the same general direction. Some of the lowest of these transverse valleys have been degraded nearly to the level of the sea, showing that if the glaciation to which the island has been subjected had been slightly greater, we should have found several islands here instead of one.

At the time of our first visit, May 28, winter still had full possession, but eleven days later we found the dwarf willows, drabas, erigerons, and saxifrages pushing up their buds and leaves, on spots bare of snow, with wonderful rapidity. This was the beginning of spring at the northwest end of the island. On July 4 the flora seemed to have reached its highest development. The bottoms of the glacial valleys were in many places covered with tall grasses and carices evenly planted and forming meadows of considerable size, while the drier portions and the sloping grounds about them were enlivened with gay, highly colored flowers from an inch to nearly two feet in height, such as *Aconitum Napellus* L., var. *delphinifolium* Ser., *Polemonium coeruleum* L., *Papaver nudicaule* L., *Draba alpina* L., and *Silene acaulis* L., in large, closely flowered tufts, as well as andromeda, ledum, linnaea, cassiope, and several species of vaccinium and saxifraga.

ST. MICHAEL

The region about St. Michael is a magnificent tundra, crowded with Arctic lichens and mosses, which here develop under most favorable conditions. In the spongy plush formed by the lower plants, in which one sinks almost knee-deep at every step, there is a sparse growth of grasses, carices, and rushes, tall enough to wave in the wind, while empetrum, the dwarf birch, and the various heathworts flourish here in all their beauty of bright leaves and flowers. The moss mantle for the most part rests on a stratum of ice that never melts to any great extent, and the ice on a bed rock of black vesicular lava. Ridges of the lava rise here and there above the general level in rough masses, affording ground for plants that like a drier soil. Numerous hollows and watercourses also occur on the general tundra, whose well-drained banks are decked with gay flowers in lavish abundance, and meadow patches of grasses shoulder-high, suggestive of regions much farther south.

The following plants and a few doubtful species not yet determined were collected here:—

- Aspidium fragrans* Sw.
Woodsia ilvensis (L.) R. Br.
Eriophorum capitatum Hos.
Carex vulgaris (Fries) Willd.
 var. *alpina*.
Lloydia serotina (Sweet)
 Reichenb.
Tofieldia coccinea Richards.
Betula nana L.
Alnus viridis DC.
Polygonum alpinum All.
Arenaria lateriflora L.
Stellaria longipes Goldie.
Silene acaulis L.
Anemone narcissiflora L.
 " *parviflora* Michx.
Caltha palustris L. var. *asari-*
 folia Rothr.
Corydalis pauciflora.
Draba alpina L.
 " *incana* L.
Eutrema arenicola Richards.
Saxifraga nivalis L.
 " *hieracifolia* Waldst.
 & Kit.
Rubus Chamaemorus L.
 " *arcticus* L.
Potentilla nivea L.
Dryas octopetala L.
Oxytropis podocarpa Gray.
Astragalus alpinus L.
- Astragalus frigidus* Gray var.
 littoralis.
Lathyrus maritimus Bigel.
Epilobium latifolium L.
Cassiope tetragone (D. Don.)
 Desv.
Andromeda polifolia L.
Loiseleuria procumbens Desv.
Vaccinium Vitis-Idaea L.
Arctostaphylos alpina Spreng.
Ledum palustre L.
Diapensia lapponica L.
Armeria vulgaris Willd.
Primula borealis Duby.
Polemonium coeruleum L.
Mertensia paniculata Desv.
Pedicularis sudetica Willd.
 " *euphrasioides* Stev.
 " *Langsdorffi* Fisch.
 var. *lanata* Gray.
Pinguicula villosa L.
Linnaea borealis Gronov.
Valeriana capitata (Pall.) Willd.
Saussurea alpina DC.
Nardosmia frigida Hook.
Senecio frigidus Less.
 " *palustris* Hook.
Arnica angustifolia Vahl.
Artemisia arctica Bess.
Matricaria inodora L.

GOLOFNIN BAY

The tundra flora on the west side of Golofnin Bay is remarkably close and luxuriant, covering almost every foot of the ground, the hills as well as the valleys, while the sandy beach and a bank of coarsely stratified moraine material a few yards back from the beach were blooming like a garden with *Lathyrus maritimus*,

Iris sibirica, *Polemonium coeruleum*, etc., diversified with clumps and patches of *Elymus arenarius*, *Alnus viridis*, and *Abies alba*.

This is one of the few points on the east side of Bering Sea where trees closely approach the shore. The white spruce occurs here in small groves or thickets of well-developed, erect trees fifteen or twenty feet high, near the level of the sea, at a distance of about six or eight miles from the mouth of the bay, and gradually becomes irregular and dwarfed as it approaches the shore. Here a number of dead and dying specimens were observed, indicating that conditions of soil, climate, and relations to other plants were becoming more unfavorable, and causing the tree-line to recede from the coast.

The following collection was made here July 10:—

<i>Aspidium spinulosum</i> Sw.	<i>Rubus arcticus</i> L.
<i>Elymus arenarius</i> L.	<i>Epilobium latifolium</i> L.
<i>Poa trivialis</i> L.	<i>Vaccinium Vitis-Idaea</i> L.
<i>Carex vesicaria</i> L., var. <i>alpigena</i> , Fries.	<i>Trientalis europaea</i> L. var. <i>arctica</i> Ledeb.
<i>Lloydia serotina</i> (Sweet) Reichenb.	<i>Gentiana glauca</i> Pall.
<i>Iris sibirica</i> L.	<i>Polemonium coeruleum</i> L.
<i>Arenaria peploides</i> L.	<i>Pinguicula villosa</i> L.
<i>Eutrema arenicola</i> Hook.	<i>Chrysanthemum arcticum</i> L.
<i>Spiraea betulifolia</i> Pall.	<i>Artemisia Tilesii</i> Ledeb.

KOTZEBUE SOUND

The flora of the region about the head of Kotzebue Sound is hardly less luxuriant and rich in species than that of other points, visited by the "Corwin," lying several degrees farther south. Fine nutritious grasses suitable for the fattening of cattle, and from two to six feet high, are not of rare occurrence on meadows of considerable extent, and along stream-banks wherever the stagnant waters of the tundra have been drained off, while in similar localities the most showy of the arctic plants bloom in all their freshness and beauty, manifesting no sign of frost, or unfavorable conditions of any kind whatever.

A striking result of the airing and draining of the boggy tundra

soil is shown on the ice-bluffs around Eschscholtz Bay, where it has been undermined by the melting of the ice on which it rests. In falling down the face of the ice-wall it is well shaken and rolled before it again comes to rest on terraced or gently sloping portions of the wall. The original vegetation of the tundra is thus destroyed, and tall grasses spring up on the fresh, mellow ground as it accumulates from time to time, growing lush and rank, though in many places that we noted these new soil-beds are not more than a foot in depth, and lie on the solid ice.

At the time of our last visit to this interesting region, about the middle of September, the weather was still fine, suggesting the Indian summer of the Western States. The tundra glowed in the mellow sunshine with the colors of the ripe foliage of vaccinium, empetrum, arctostaphylos, and dwarf birch; red, purple, and yellow, in pure bright tones, while the berries, hardly less beautiful, were scattered everywhere as if they had been sown broadcast with a lavish hand, the whole blending harmoniously with the neutral tints of the furred bed of lichens and mosses on which the bright leaves and berries were painted.

On several points about the sound the white spruce occurs in small, compact groves within a few miles of the shore; and pyrola, which belongs to wooded regions, is abundant where no trees are now in sight, tending to show that areas of considerable extent, now treeless, were once forested.

The plants collected are:

<i>Luzula hyperborea</i> R. Br.	<i>Lupinus arcticus</i> Watson.
<i>Allium schoenoprasum</i> L.	<i>Hedysarum boreale</i> Nutt.
<i>Salix polaris</i> Wahlenb.	<i>Empetrum nigrum</i> L.
<i>Polygonum viviparum</i> L.	<i>Pyrola rotundifolia</i> L. var. <i>pumila</i> Hook.
<i>Stellaria longipes</i> Goldie.	
<i>Cerastium alpinum</i> L. var. <i>Behringianum</i> Regel.	<i>Arctostaphylos alpina</i> Spreng.
<i>Papaver nudicaule</i> L.	<i>Cassiope tetragona</i> (D. Don.) Desv.
<i>Saxifraga tricuspida</i> Retz.	<i>Ledum palustre</i> L.
<i>Potentilla anserina</i> L. var.	<i>Vaccinium Vitis-Idaea</i> L.
“ <i>biflora</i> Willd.	<i>Vaccinium uliginosum</i> L. var.
“ <i>fruticosa</i> L.	<i>mucronata</i> Herder.

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| <i>Armeria vulgaris</i> Willd. var. <i>arctica</i> Cham. | <i>Castilleia pallida</i> Kunth. |
| <i>Trientalis europaea</i> L. var. <i>arctica</i> Ledeb. | <i>Pedicularis sudetica</i> Willd. |
| <i>Mertensia maritima</i> L. (S. F. Gray), Desv. | “ <i>verticillata</i> L. |
| | <i>Galium boreale</i> L. |
| | <i>Senecio palustris</i> Hook. |

CAPE THOMPSON

The Cape Thompson flora is richer in species and individuals than that of any other point on the Arctic shores we have seen, owing no doubt mainly to the better drainage of the ground through the fissured frost-cracked limestone, which hereabouts is the principal rock.

Where the hill-slopes are steepest the rock frequently occurs in loose, angular masses, and is entirely bare of soil. But between these barren slopes there are valleys where the showiest of the arctic plants bloom in rich profusion and variety, forming brilliant masses of color—purple, yellow, and blue—where certain species form beds of considerable size, almost to the exclusion of others.

The following list was obtained here July 19:

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|---|---|
| <i>Cystopteris fragilis</i> (L.) Bernh. | <i>Arenaria arctica</i> Stev. |
| <i>Trisetum subspicatum</i> Beauv. | <i>Stellaria longipes</i> Goldie. |
| var. <i>molle</i> Gray. | <i>Anemone narcissiflora</i> L. |
| <i>Glyceria</i> — | “ <i>multifida</i> Poir. |
| <i>Festuca sativa</i> (?) [F. <i>ovina</i> L.?]] | “ <i>parviflora</i> Michx. |
| <i>Carex rariflora</i> Wahlenb. | “ <i>parviflora</i> Michx. va- |
| “ <i>vulgaris</i> Fries, var. <i>alpina</i> (<i>C. rigida</i> Good.) | riety. |
| <i>Salix polaris</i> Wahlenb. and two other species undetermined. | <i>Ranunculus affinis</i> R. Br. |
| <i>Polygonum Bistorta</i> L. | <i>Caltha asarifolia</i> DC. |
| <i>Rumex crispus</i> L. | <i>Papaver nudicaule</i> L. |
| <i>Cerastium alpinum</i> L. var. <i>Behringianum</i> Regel. | <i>Draba stellata</i> Jacq. var. <i>nivalis</i> |
| <i>Silene acaulis</i> L. | Regel. |
| <i>Arenaria verna</i> L. var. <i>rubella</i> Hook. f. | <i>Draba incana</i> L. |
| | <i>Cardamine pratensis</i> L. |
| | <i>Cheiranthus pygmaeus</i> Adams. |
| | <i>Pedicularis capitata</i> Adams. |
| | <i>Geum glaciale</i> Fisch. |

<i>Nardosmia corymbosa</i> Hook.	<i>Vaccinium uliginosum</i> L. var.
<i>Erigeron Muirii</i> Gray n. sp.	<i>mucronata</i> Herder.
<i>Parrya nudicaulis</i> (Boiss.)	<i>Vaccinium Vitis-Idaea</i> L.
Regel, var. <i>aspera</i> Regel.	<i>Dodecatheon Meadia</i> L. var.
<i>Boykinia Richardsoni</i> Gray.	<i>frigidum</i> Gray.
<i>Saxifraga tricuspida</i> Retz.	<i>Androsace chamaejasme</i> Willd.
“ <i>cernua</i> L.	<i>Phlox sibirica</i> L.
“ <i>flagellaris</i> Willd.	<i>Polemonium humile</i> Willd.
“ <i>davurica</i> Willd.	“ <i>coeruleum</i> L.
“ <i>punctata</i> L.	<i>Myosotis sylvatica</i> var. <i>alpestris</i>
“ <i>nivalis</i> L.	Hoffm.
<i>Dryas octopetala</i> L.	<i>Eritrichium nanum</i> Schrad. var.
<i>Potentilla biflora</i> Willd.	<i>arctioides</i> .
“ <i>nivea</i> L.	<i>Taraxacum palustre</i> DC.
<i>Hedysarum boreale</i> Nutt.	<i>Senecio frigidus</i> Less.
<i>Oxytropis podocarpa</i> Gray.	<i>Artemisia glomerata</i> Ledeb.
<i>Epilobium latifolium</i> L.	“ <i>tomentosa</i> [<i>tomentella</i>
<i>Cassiope tetragone</i> (D. Don.)	Trautv.?] Desv.

CAPE PRINCE OF WALES

At Cape Prince of Wales we obtained:

<i>Tofieldia coccinea</i> Richards.	<i>Vaccinium Vitis-Idaea</i> L.
<i>Loiseleuria procumbens</i> Desv.	<i>Armeria arctica</i> (Wallr.) Stev.
<i>Andromeda polifolia</i> L. forma	<i>Androsace chamaejasme</i> Willd.
<i>arctica</i> .	<i>Taraxacum palustre</i> DC.

TWENTY MILES EAST OF CAPE LISBURNE

<i>Lychnis apetala</i> L.	<i>Oxytropis campestris</i> DC.
<i>Anemone narcissiflora</i> L. var.	<i>Primula borealis</i> Duby.
<i>Draba hirta</i> L.	<i>Androsace chamaejasme</i> Willd.
<i>Saxifraga Eschscholtzii</i> Sternb.	<i>Phlox sibirica</i> L.
“ <i>flagellaris</i> Willd.	<i>Geum glaciale</i> Fisch.
<i>Chrysosplenium alternifolium</i> L.	<i>Erigeron uniflorus</i> L.
<i>Potentilla nivea</i> L.	<i>Artemisia glomerata</i> Ledeb.
“ <i>biflora</i> Willd.	

CAPE WANKAREM, SIBERIA

Near Cape Wankarem, August 7 and 8, we collected:

<i>Elymus arenarius</i> L.	“ <i>stellaris</i> L. var. <i>co-</i>
<i>Alopecurus alpinus</i> Sm.	<i>mosa</i>
<i>Poa arctica</i> R. Br.	<i>Saxifraga rivularis</i> L. var. <i>hy-</i>
<i>Calamagrostis deschampsoides</i>	<i>perborea</i> Hook.
Trin.	<i>Polemonium coeruleum</i> L.
<i>Luzula hyperborea</i> R. Br.	<i>Pedicularis Langsdorffi</i> Fisch.
“ <i>spicata</i> (DC.) Desv.	<i>Nardosmia frigida</i> Hook.
<i>Lychnis apetala</i> L.	<i>Chrysanthemum arcticum</i> L.
<i>Claytonia virginica</i> L.	<i>Senecio frigidus</i> Less.
<i>Ranunculus pygmaeus</i> Wahlenb.	<i>Artemisia vulgaris</i> var. <i>Tilesii</i>
<i>Chrysosplenium alternifolium</i> L.	Ledeb.
<i>Saxifraga cernua</i> L.	

PLOVER BAY, SIBERIA

The mountains bounding the glacial fiord called Plover Bay, though beautiful in their combinations of curves and peaks as they are seen touching each other delicately and rising in bold, picturesque groups, are nevertheless severely desolate-looking from the absence of trees and large shrubs, and indeed of vegetation of any kind dense enough to give color in telling quantities, or to soften the harsh rockiness of the steepest portions of the walls. Even the valleys opening back from the water here and there on either side are mostly bare as seen at a distance of a mile or two, and show only a faint tinge of green, derived from dwarf willows, heathworts, and sedges chiefly.

The most interesting of the plants found here are *Rhododendron kamschaticum* Pall., and the handsome blue-flowered *Saxifraga oppositifolia* L., both of which are abundant.

The following were collected July 12 and August 26:

<i>Arenaria macrocarpa</i> Pursh.	“ <i>punctata</i> L.
<i>Aconitum Napellus</i> L. var. <i>del-</i>	“ <i>caespitosa</i> L.
<i>phinifolium</i> Ser.	<i>Dryas octopetala</i> L.
<i>Anemone narcissiflora</i> L.	<i>Oxytropis podocarpa</i> Gray.
<i>Draba alpina</i> L.	<i>Rhododendron kamschaticum</i> ,
<i>Parrya Ermanni</i> Ledeb.	Pall.
<i>Saxifraga oppositifolia</i> L.	

- Cassiope tetragona* (D. Don.) *Gentiana glauca* Pall.
 Desv. *Geum glaciale* Fisch.
Diapensia lapponica L.

HERALD ISLAND

On Herald Island the common polar cryptogamous vegetation is well represented and developed. So also are the flowering plants, almost the entire surface of the island, with the exception of the sheer, crumbling bluffs along the shores, being quite tellingly dotted and tufted with characteristic species. The following list* was obtained:—

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| <i>Gymnandra Stelleri</i> Cham. & Schlecht. | <i>Saxifraga sileniflora</i> (Hook.) Sternb. |
| <i>Alopecurus alpinus</i> Sm. | <i>Saxifraga bronchialis</i> L. |
| <i>Luzula hyperborea</i> R. Br. | “ <i>stellaris</i> L. var. <i>comosa</i> Poir. |
| <i>Salix polaris</i> Wahlenb. | <i>Saxifraga rivularis</i> L. var. <i>hyperborea</i> Hook. |
| <i>Stellaria longipes</i> Goldie var. <i>Edwardsii</i> T. & G. | <i>Saxifraga hieracifolia</i> Waldst. & Kit. |
| <i>Papaver nudicaule</i> L. | <i>Potentilla frigida</i> Vill.? |
| <i>Draba alpina</i> L. | <i>Senecio frigidus</i> Less. |
| <i>Saxifraga punctata</i> L. | |
| “ <i>serpyllifolia</i> Pursh. | |

WRANGELL LAND

Our stay on the one point of Wrangell Land that we touched was far too short to admit of making anything like as full a collection of the plants of so interesting a region as was desirable. We found the rock formation where we landed and for some distance along the coast to the eastward and westward to be a close-grained clay slate, cleaving freely into thin flakes, with here and there a few compact, metamorphic masses that rise above the general surface. Where it is exposed along the shore bluffs and kept bare of vegetation and soil by the action of the

* Berthold Seemann, botanist of H. M. S. Herald in 1849, reported the finding of eight plants on a width of thirty feet of shore, which, he says, “was the whole extent we had to walk over.” The plants were the following: *Artemisia borealis*, *Cochleria fenestrata*, *Saxifraga lamentiniana*, *Poa arctica*, and another undetermined grass, *Hepatica*, a moss, and red lichen covering the rocks. [EDITOR.]

ocean, ice, and heavy snow-drifts, the rock presents a surface about as black as coal, without even a moss or lichen to enliven its somber gloom. But when this dreary barrier is passed the surface features of the country in general are found to be finely moulded and collocated, smooth valleys, wide as compared with their depth, trending back from the shore to a range of mountains that appear blue in the distance, and round-topped hills, with their side curves finely drawn, touching and blending in beautiful groups, while scarce a single rock-pile is seen or sheer-walled bluff to break the general smoothness.

The soil has evidently been derived mostly from the underlying slates, though a few fragmentary wasting moraines were observed, containing traveled boulders of quartz and granite which doubtless were brought from the mountains of the interior by glaciers that have recently vanished—so recently that the outlines and sculptured hollows and grooves of the mountains have not as yet suffered sufficient post-glacial denudation to mar appreciably their glacial characters.

The banks of the river at the mouth of which we landed presented a striking contrast as to vegetation to that of any other stream we had seen in the Arctic regions. The tundra vegetation was not wholly absent, but the mosses and lichens of which it is elsewhere composed are about as feebly developed as possible, and instead of forming a continuous covering they occur in small separate tufts, leaving the ground between them raw and bare as that of a newly ploughed field. The phanerogamous plants, both on the lowest grounds and on the slopes and hilltops as far as seen, were in the same severely repressed condition, and as sparsely planted in tufts an inch or two in diameter, with from one to three feet of naked soil between them. Some portions of the coast, however, farther south, presented a greenish hue as seen from the ship at a distance of eight or ten miles, owing no doubt to vegetation growing under less unfavorable conditions.

From an area of about half a square mile the following plants were collected:

<i>Gymnandra Stelleri</i> Cham. & Schlecht.	<i>Saxifraga sileniflora</i> (Hook.) Sternb.
<i>Poa arctica</i> R. Br.	<i>Saxifraga hieracifolia</i> Waldst. & Kit.
<i>Aira caespitosa</i> L. var. <i>arctica</i> .	<i>Saxifraga rivularis</i> L. var. <i>hyperborea</i> Hook.
<i>Alopecurus alpinus</i> Sm.	<i>Saxifraga bronchialis</i> L.
<i>Luzula hyperborea</i> R. Br.	“ <i>serpyllifolia</i> Pursh.
<i>Stellaria longipes</i> Goldie var. <i>Edwardsii</i> T. & G.	<i>Potentilla nivea</i> L.
<i>Cerastium alpinum</i> L.	“ <i>frigida</i> Vill.? *
<i>Anemone parviflora</i> Michx.	<i>Armeria macrocarpa</i> Pursh.
<i>Papaver nudicaule</i> L.	“ <i>vulgaris</i> Willd.
<i>Draba alpina</i> L.	<i>Artemisia borealis</i> (Pall.) Willd.
<i>Cochlearia officinalis</i> L.	<i>Nardosmia frigida</i> Hook.
<i>Saxifraga flagellaris</i> Willd.	<i>Saussurea monticola</i> Richards.
<i>Saxifraga stellaris</i> L. var. <i>comosa</i> Poir.	

SOME FARTHEST NORTH LICHENS AND MOSSES OF
THE PEARY ARCTIC EXPEDITION TO
GRANT LAND IN 1906

BY R. S. WILLIAMS

This small collection comes from near the known northern limit of vegetation, namely the north shore of Grant Land, N. Lat. about 82° 27' to 82° 30' and is chiefly interesting for that reason as the species are all common and widely distributed in somewhat lower latitudes. Quite a number of flowering plants occur in the same region, some 22 species being listed by Dr. Rydberg for Grant Land, see *Torreyia* 11: 249-259. 1911, and *Torreyia* 12: 1-11. 1912.

The cryptogams were sent to the Botanical Garden by the American Museum of Natural History, being obtained by Dr. L. J. Wolf in July, 1906, when a member of the Peary Arctic Expedition.

* "*Potentilla emarginata*, Pursh. A very dwarf form of this species from Wrangell Land was inadvertently named *Potentilla frigida* in the list of Muir's collection." (Note by Asa Gray in House Executive Document No. 44 (1884-85), p. 191.) [EDITOR.]